

What is claimed is:

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1. A method for use in detecting deception of a person, the method comprising:
    - 5 providing thermal image data of at least a region of a face of a person; and transforming the thermal image data to blood flow rate data for use in determining whether the person is deceptive or non-deceptive.
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- 10 2. The method of claim 1, wherein determining whether the person is deceptive or non-deceptive comprises classifying the person as deceptive or non-deceptive based on a change of blood flow rate over time in the at least one region of the face.
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- 15 3. The method of claim 1, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.
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- 20 4. The method of claim 1, wherein providing the thermal image data comprises providing thermal image data of at least a region proximate an eye of the person.
  - 25 5. The method of claim 1, wherein providing the thermal image data comprises providing thermal image data of more than one region of the face of the person.
  6. The method of claim 1, wherein providing thermal image data comprises:

asking the person a question to elicit a response therefrom;  
focusing a thermal infrared image device operable to provide thermal image data on at least the region of the face of the person; and  
capturing thermal image data during at least a period of time during  
5 at least the response from the person.

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7. The method of claim 6, wherein determining whether the person is deceptive or non-deceptive based on the blood flow rate data comprises determining whether the person is being deceptive or non-deceptive with respect to the response to the question.  
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8. The method of claim 1, wherein providing thermal image data comprises:  
focusing a thermal infrared image device operable to provide thermal  
15 image data on at least the region of the face of the person;  
capturing frames of thermal image data during at least a period of time; and  
tracking movement of at least the region of the face of the person.

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20 9. The method of claim 1, wherein the method further comprises providing measurement of one or more physiological parameters different than blood flow rate obtained using thermal image data, and further wherein determining whether the person is deceptive or non-deceptive comprises determining whether the person is deceptive or non-deceptive based on  
25 blood flow rate obtained using thermal image data and the one or more physiological parameters.

10. The method of claim 9, wherein determining whether the person is deceptive or non-deceptive comprises:

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making a preliminary determination of whether the person is deceptive or non-deceptive based on the one or more physiological parameters and making preliminary determination based on blood flow rate obtained using thermal image data; and

5 confirming one preliminary determination by comparing it to the other.

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11. The method of claim 9, wherein providing measurement of one or more physiological parameters comprises providing measurement of the one or more physiological parameters using at least one invasive technique.

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12. A system for use in detecting deception of a person, the system comprising:

a thermal infrared image device operable to provide thermal image data of at least a region of a face of a person; and

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a computing apparatus operable upon the thermal image data to transform the thermal image data to blood flow rate data for use in determining whether the person is deceptive or non-deceptive.

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13. The system of claim 12, wherein the computing apparatus is further operable to classify the person as deceptive or non-deceptive based on a change of blood flow rate over time in the at least one region of the face.

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14. The system of claim 12, wherein the computing apparatus is further operable to transform the thermal image data using a thermodynamic model where blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

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15. The system of claim 12, wherein the thermal infrared image device is operable to provide thermal image data of at least a region proximate an eye of the person.

5 16. The system of claim 12, wherein the thermal infrared image device is operable to provide thermal image data of more than one region of the face of the person.

10 17. The system of claim 12, wherein the thermal infrared image device is operable to capture thermal image data during at least a period of time during at least an elicited response from the person.

15 18. The system of claim 17, wherein the computing apparatus is operable to determine whether the person is deceptive or non-deceptive based on the blood flow rate data corresponding to the thermal image data captured during at least the elicited response.

20 19. The system of claim 12, wherein the thermal infrared image device is operable to capture frames of thermal image data during at least a period of time, and further wherein the computing apparatus is further operable to track movement of at least the region of the face of the person during the period of time.

25 20. The system of claim 12, wherein the system further comprises means for providing measurement of one or more physiological parameters different than blood flow rate obtained using thermal image data, and further wherein the computing apparatus is operable to determine whether the person is deceptive or non-deceptive based on the blood flow rate data

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obtained using thermal image data and the one or more physiological parameters.

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21. The system of claim 20, wherein the computing apparatus is further operable to make a preliminary determination of whether the person is deceptive or non-deceptive based on the one or more physiological parameters and to make a preliminary determination of whether the person is deceptive or non-deceptive based on the blood flow rate data obtained using thermal image data, and thereafter, the computing apparatus is operable to confirm one preliminary determination by comparison to the other.

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22. The system of method of claim 20, wherein the means for providing measurement of one or more physiological parameters different than blood flow rate obtained using thermal image data comprises one or more invasive means for providing invasive measurement of one or more physiological parameters different than blood flow rate.

23. A polygraph method for use in determining whether a person is being deceptive or non-deceptive with respect to a response elicited from the person, the method comprising:

capturing thermal image data from at least one region of the face of the person during at least the elicited response;

transforming the thermal image data to blood flow rate data representative of a change of blood flow rate over time in the at least one region of the face; and

classifying the person as deceptive or non-deceptive with respect to the elicited response based on the blood flow rate data.

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24. The method of claim 23, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

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25. The method of claim 23, wherein capturing the thermal image data comprises capturing thermal image data of at least a region proximate an eye of the person.

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- 10 26. The method of claim 23, wherein capturing the thermal image data comprises capturing thermal image data of more than one region of the face of the person.

- 15 27. The method of claim 23, wherein the method further comprises tracking movement of at least the region of the face of the person during the capturing of the thermal image data.

- 20 28. The method of claim 23, wherein the method further comprises providing measurement of one or more physiological parameters different than the change in blood flow rate obtained using thermal image data, and wherein classifying the person as deceptive or non-deceptive comprises determining whether the person is deceptive or non-deceptive based on the change of blood flow rate and the one or more physiological parameters.

- 25 29. The method of claim 28, wherein providing measurement of the one or more physiological parameters comprises providing measurement of one or more physiological parameters different than blood flow rate data obtained using thermal image data using at least one invasive method.

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30. A method for use in monitoring blood flow rate, the method comprising:

providing thermal image data of at least a region of a face of a person; and

5 transforming the thermal image data to blood flow rate information.

31. The method of claim 30, wherein transforming the thermal image data comprises transforming the thermal image data using a thermodynamic model where blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

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32. The method of claim 30, wherein providing the thermal image data comprises providing thermal image data of at least a region proximate an eye of the person.

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33. The method of claim 30, wherein providing the thermal image data comprises providing thermal image data of more than one region of the face of the person.

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34. The method of claim 30, wherein providing thermal image data comprises:

focusing a thermal infrared image device operable to provide thermal image data on at least the region of the face of the person;

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capturing frames of thermal image data during at least a period of time; and

tracking movement of at least the region of the face of the person.

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35. The method of claim 30, wherein the method further comprises determining a physiological state of the person based on the blood flow rate information.

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5    36. A system for use in monitoring blood flow rate, the system comprising:  
a thermal infrared image device operable to provide thermal image data of at least a region of a face of a person; and  
10    a computing apparatus operable upon the thermal image data to transform the thermal image data to blood flow rate information.

15    37. The system of claim 36, wherein the computing apparatus is operable to transform the thermal image data using a thermodynamic model where blood flow rate is inversely proportional to the square of skin temperature deviation from a core temperature of a human body.

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20    38. The system of claim 36, wherein the computing apparatus is further operable to determine a physiological state of the person based on the blood flow rate information.

25    39. The system of claim 36, wherein the thermal infrared image device is operable to provide thermal image data of at least a region proximate an eye of the person.

40. The system of claim 36, wherein the thermal infrared image device is operable to capture frames of thermal image data during at least a period of time, and further wherein the computing apparatus is further operable to track movement of at least the region of the face of the person during the period of time.

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